IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

A Comparative Study of Driver Behaviour Assessment Frameworks and their Impact on Traffic Accident Reduction

Sibi S Babu
Research Scholar, Vikrant University, Gwalior

Abstract: *Road traffic accidents (RTA) continue to be a serious public health and socio-economic problem in India, accounting for substantial proportion of mortality, disability and economic burden. As per reports from the Ministry of Road Transport and Highways (MoRTH) and National Crime Records Bureau (NCRB), human behavior is one of the major contributors to road accidents in India, with overspeeding, distracted driving, not adhering to traffic rules, and fatigue cited as some of the primary causes.*

Comparative analysis of Driver Behaviour Assessment Frameworks (DBAFs) based on Indian road conditions and driving behaviour patterns has been presented. The present study relies on secondary data from various government sources in India such as MoRTH, NCRB, NITI Aayog, ARAI, Transportation research institutions and literature related to ITS which are relevant in Indian context.

This study examines the accuracy, predictive power, and accident prevention capabilities of traditional observational, telematics-based, and simulator training and artificial intelligence (AI) monitoring systems. The results suggest that AI-powered and telematics-equipped systems can be much more efficient in detecting hazardous driving patterns and lowering the likelihood of accidents in intricate Indian traffic conditions.

For the comparative analysis, the Driver Behaviour Assessment Framework (DBAF) is suggested that is unique to India. This combines the behavioural detection with the telematics scoring and the India-specific traffic adaptation mechanisms to overcome issues like the mixture of traffic, notional lane discipline and infrastructure limitations.

But there are cost, infrastructure, privacy and driver acceptance challenges that need to be addressed in order to implement it on a large-scale. The study recommends the inclusion of intelligent behavioural monitoring systems in the Indian national road safety policy to enhance road safety and minimise the number of road accidents in India..

Keywords: Driver behaviour, India, road safety, MoRTH, telematics, AI monitoring, traffic accidents, ITS

I. INTRODUCTION

Road traffic accidents constitute one of the biggest public health and socio-economic problem in India as well as in the whole world. The Ministry of Road Transport and Highways (MoRTH), India has been seeing a large number of road crashes annually and it is also causing loss of human lives, injuries, and economic losses. The main factors are unsafe driving behaviour (overspeeding, distracted driving, tired driving, non-compliance with traffic rules, poor decision making behaviour).

These incidents kill and injure people, as well as cost a significant amount of the economy in terms of medical costs, property damage, insurance costs, and lost productivity. In all the contributing factors, driver behaviour has been

DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

identified as one of the most critical factors affecting the road safety and traffic efficiency especially in developing countries such as India where traffic is more complex and heterogeneous in nature.

Generally, road safety strategies have aimed at road infrastructure improvements, upgrading vehicle safety regulations, and toughening up traffic law enforcement. The last few years have seen, however, an increasing focus on the role of human behavioral factors in the causation of road accidents, including aggression, emotional instability, distraction, risk-taking behaviors and delayed reaction time.

This has led to the creation of a number of Driver Behaviour Assessment Frameworks (DBAFs) that are designed to systematically analyse driver behaviour in order to identify risky patterns. They now encompass psychological testing, driving simulators, telematics monitoring systems, artificial intelligence (AI) driver monitoring systems, mobile sensor technologies, real-time behavioural analysis and machine learning.

This comparative assessment of these frameworks is critical in the Indian context where the traffic conditions are mixed, lane discipline is limited, and road user behaviour is varied. Such analysis is crucial to determine which of these practices are the most effective ways to improve driver behavior, improve road safety and reduce traffic accidents.

India has its own traffic issues which are not given due consideration in the global driver behaviour assessment models. Heterogeneous traffic mix, poor lane discipline, presence of non-motorized users and different road infrastructure makes it necessary to have a specific framework to assess behaviours. Hence, it is imperative to have a Driver Behaviour Assessment Framework (IDBAF) specific to the context of India to help enhance the safety of the road.

II. OBJECTIVES OF THE STUDY

The main objectives of this study are as follows:

1. This study aims to achieve the following main objectives:
2. To explore and evaluate different Driver Behaviour Assessment Frameworks (DBAFs) relevant to Indian road and traffic situations.
3. To explore and assess important behavioural issues that could be a cause of road accidents in India like overspeeding, distraction, fatigue and violation of traffic rules.
4. To compare the effectiveness of the traditional method of driver assessment with the modern technology-based systems, telematics, artificial intelligence (AI) and sensor-based monitoring systems.
5. To assess the impact and effectiveness of different driver behaviour assessment frameworks in reducing road traffic accidents, particularly in Indian transportation settings.
6. To highlight major issues in implementation like infrastructure constraints, cost factors, privacy issues, acceptance issues among drivers and recommend appropriate policy recommendations for better road safety in India.[1]

III. LITERATURE REVIEW

Shinar (2022) stated that high-risk driving behaviours like aggression, speeding, distraction and emotional instability significantly raise the risk of a road crash. His research emphasizes the need for driver psychology to be part and parcel of road safety management. The research also indicates that by carefully observing patterns of behavior, accidents can be reduced by intervening at the right time[2].

Likewise, Taubman-Ben-Ari and colleagues (2022) investigated risky driving among young drivers and reported that sensation-seeking, overconfidence, and emotional instability were significant risk factors for crashes. They conclude

[1] Ajzen, I. (2021). The theory of planned behavior: Recent developments and applications. Organizational Behavior and Human Decision Processes, 165, 1–12.

[2] Shinar, D. (2022). Traffic safety and human behavior (2nd ed.). Emerald Publishing.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 10, June 2026 Impact Factor: 8.2

that behavioural profiling is an effective tool to enhance driver training programs and tailor interventions to address road safety issues.[3]

Given the role of in-vehicle monitoring technologies, Regan and Young (2022) showed that telematics-based feedback systems can be an effective way to significantly lower unsafe driving behaviours, including speeding and harsh braking, especially in the case of commercial vehicle drivers. The study pointed out that ongoing behavioural feedback fosters driver accountability and promotes adherence to traffic laws.[4]

The development of intelligent monitoring system was also emphasized by Chan and Zhang (2023) who reviewed the AI system for driver monitoring. They discovered that facial recognition, eye-tracking, and machine learning algorithms are very responsive in recognizing driver distraction, fatigue, and immediate crash risk signals, facilitating proactive safety actions.[5]

Also, the predictive analytics role in transportation systems was highlighted by Abdel-Aty (2023), who claimed that AI-based intelligent transportation systems (ITS) can greatly increase the accuracy of accident predictions and help develop more effective preventive road safety strategies. These systems are more effective than traditional observational systems in detecting behaviors in real time and issuing automatic alerts.[6]

According to the reports of the MoRTH and NCRB in India, overspeeding, distraction, and violations of traffic rules are the primary causes of accidents. But, there is a lack of comparative studies between various Driver Behaviour Assessment Frameworks (DBAFs) under mixed traffic conditions in India.

Hence this study is limited to comparative study of traditional driver behaviour assessment system and the technology based driver behaviour assessment system in Indian context.

IV. RESEARCH METHODOLOGY

The study uses the descriptive and comparative analytical research approach to investigate different Driver Behaviour Assessment Frameworks (DBAFs) and its utilization in decreasing road traffic accidents especially in India. The research is done based on secondary source of information from the trusted sources like academic journals, reports of Ministry of Road Transport and Highways (MoRTH), National Crime Records Bureau (NCRB) reports, Transportation Safety Agencies, and studies about Intelligent Transportation Systems (IT).

The effectiveness, applicability, strengths and weaknesses of the various driver behaviour assessment systems such as traditional observation-based approaches, telematics-based approaches, driving simulators and approaches based on AI-based monitoring are examined using a comparative analysis approach. This method allows for the systematic analysis of the effect of each of these frameworks on driver performance and the likelihood of reducing accidents.[7]

Moreover, qualitative and interpretative methods are used to analyse the most significant behavioural parameters like distraction, fatigue, speeding, reaction time, aggression, compliance with the traffic rules etc. It also assesses the predictive ability, technological integration, and efficiency of real-time monitoring of each framework.

The overall goal of the methodology is to find out the most effective driver behaviour assessment system in the field of road safety and minimizing traffic accidents in India. The gathered data are logically categorized, compared and

[3] Ben-Ari, O. T., Lotan, T., & Prato, C. G. (2022). Risky driving behaviours among young drivers and behavioural profiling approaches. Accident Analysis & Prevention, 168, 106602.
[4] Regan, M. A., & Young, K. (2022). Driver distraction and telematics-based safety interventions. Safety Science, 146, 105548.
[5] Chan, C. Y., & Zhang, J. (2023). AI-based driver monitoring systems and road safety applications. Transportation Research Part F: Traffic Psychology and Behaviour, 94, 245–260.
[6] Abdel-Aty, M., & Mahmoud, N. (2023). Artificial intelligence and predictive analytics in transportation safety systems. Journal of Transportation Safety & Security, 15(4), 455–472.
[7] NITI Aayog. (2022). Transforming Mobility in India: Policy and Safety Framework Report. Government of India.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

analyzed to obtain key findings regarding the intelligent behavioural monitoring systems in the modern transportation safety management.[8].

4.1 Research Design

The study is a descriptive, comparative and analytical research with qualitative secondary data analysis. The descriptive approach is used to explain different Driver Behaviour Assessment Frameworks (DBAFs) and behavioural factors associated with road traffic accidents. Comparative method used to compare traditional and technology-based DBAFs such as telematics, simulator-based and AI-based.

The analytical part explores the potential of driver behaviour monitoring systems in reducing accidents and improving road safety. This design is suitable because it allows for a comparative study of the various approaches to behaviour assessment and their practical relevance in road safety management[9].

4.2 Sources of Data

The study relies on secondary data which was done from the reliable and authenticated sources such as:

- The journals on transportation safety and behavioural science are published.The Journal of Transportation Safety and Behavioural Science is published.
- The Ministry of Road Transport and Highways (MoRTH) releases the reports.
- The data on accidents is obtained from the National Crime Records Bureau (NCRB).Accident statistics are provided by the National Crime Records Bureau (NCRB).
- Reports are submitted to the transportation safety agencies.
- Accident databases from the Ministry of Transport and other sources
- Technical reports detailing the Intelligent Transportation System are provided.Technical reports on Intelligent Transportation System are available.
- Analysis of behaviour in psychology and driver behaviour.

They offer theoretical, statistical, behavioural and technological understanding of driver behaviour assessment and accident prevention.[10]

4.3 Comparative Parameters

To evaluate the DBAFs, the following parameters were used:

- The accuracy of behaviour assessment.
- Real-time monitoring capability
- The cost effectiveness and feasibility of implementation
- The flexibility and receptivity of the driver

Effectiveness in accident reduction:

- Technological integration level
- The regularity and uniformity of data gathering.
- Being able to forecast and detect dangerous behaviour.

Each of these parameters can be used to evaluate the pros and cons of each of these frameworks as applied to transportation safety systems.

---

[8] Ben-Ari, O. T., Lotan, T., & Prato, C. G. (2022). Risky driving behaviours among young drivers and behavioural profiling approaches. Accident Analysis & Prevention, 168, 106602.

[9] Chan, C. Y., & Zhang, J. (2023). AI-based driver monitoring systems and road safety applications. Transportation Research Part F: Traffic Psychology and Behaviour, 94, 245–26.

[10] Indian Highways Management Company Limited (IHMCL). (2023). Telematics-based highway safety monitoring report. New Delhi.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

4.4 Data Analysis Technique

The secondary data collected were analysed using comparative and qualitative analysis. This study systematically compares the traditional driver behaviour assessment system with the intelligent driver behaviour assessment system based on monitoring efficiency, predictive ability, the reduction potential of traffic accidents, and the adaptability of the technology.

Another approach was to examine behavioural trends and results of previous transportation safety studies through interpretative analysis. The results were tabulated and compared to clearly interpret the academic significance of the driver behaviour monitoring system.

4.5 Scope of the Study

This study focuses only on the Driver Behaviour Assessment Frameworks for modern transportation systems. It emphasizes upon behavioral monitoring in:

- Commercial transport systems
- Public transport services
- Fleet management operations
- Smart and Intelligent Transportation Systems (ITS)

This study does not address engineering analysis of the vehicle design and road infrastructure, but only behavioural assessment technologies and their role in the road safety improvement [11].

4.6 Limitations of the Study

The study is entirely secondary data and may contain inaccuracies and/or incompleteness. No primary data was gathered, for example through survey, interviews or experimental driving tests.

Furthermore, the effectiveness of driver behaviour assessment may be different across geographic regions, depending on the availability of infrastructure, the characteristics of the driver population, and the policy environment. Implementing outcomes may also be affected by financial resources and technological readiness.

4.7 Framework Evaluation Method

The study compares the driver behaviour assessment frameworks with a standardised scoring system according to the following parameters:

- Behaviour detection accuracy
- Real-time monitoring capability
- Predictive analytics strength
- The cost feasibility in Indian context
- Adequacy for combining traffic types
- Accident reduction potential

All the frameworks are evaluated on 1 to 5 scale and comparative analysis is done to find the best framework for Indian roads.

V. RESULTS AND DISCUSSION

5.1 Comparative Evaluation of Driver Behaviour Assessment Frameworks

Significant differences are identified among the efficiency of the monitoring, the predictive power, adaptability to technology and accident reduction potential associated with Driver Behaviour Assessment Frameworks (DBAFs). The

[11] National Highway Traffic Safety Administration. (2024). Driver Behaviour and Crash Statistics Report. U.S. Department of Transportation.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

results show that technology-based systems, especially AI-powered and telematics-based systems, are more effective than traditional observational systems at identifying risky driving behaviour.

These sophisticated solutions offer live monitoring, predictive features, and instant feedback, enhancing driver safety and minimizing potential accidents. Traditional systems, on the other hand, have no capability for continuous monitoring or predictive, so they do not work well in the modern traffic environment.

Table 1: Comparative Performance of Driver Behaviour Assessment Frameworks

Parameters	Traditional Framework	Telematics Framework	AI-Based Framework	Simulator-Based Framework
Monitoring Type	Manual	Real-time	Intelligent automated	Virtual simulation
Accuracy	Moderate	High	Very High	High
Cost	Low	Moderate	High	High
Predictive Capability	Low	Moderate	Very High	Moderate
Driver Feedback	Limited	Continuous	Intelligent	Controlled
Accident Reduction Potential	Moderate	High	Very High	High

Source: Compiled by the researcher based on secondary data.

According to the results, AI-based Driver Behaviour Assessment Frameworks (DBAFs) have a higher positive impact on reducing road traffic accidents than traditional and other technology-based systems. They are said to be superior due to their predictive analytics, machine learning integration, and real-time behaviour monitoring features.

AI systems excel at prediction, especially in identifying high-risk driving habits and behaviors like driver fatigue, distraction, abnormal eye movements, delayed reaction times, or unsafe driving patterns before they escalate into accidents. This allows for early intervention and risk prevention.

Traditional assessment systems, on the other hand, have comparatively less effectiveness, as they rely on periodic manual assessments. They are not always monitored and analyzed in real-time, reducing their ability to predict accidents and therefor their effectiveness.

Systems based on telematics also prove to be very effective in monitoring behaviors like speeding, hard braking and sudden acceleration or deviating from the set route. Moderate effectiveness found with simulator-based systems, especially in driver training and risk perception skills improvements [12].

5.2 Behavioural Factors Responsible for Traffic Accidents

The study pinpoints some important behavioural risk factors which lead to road accidents. Secondary data analysis revealed that distracted driving and overspeeding are the two most important factors.[13].

Table 2: Major Behavioural Factors Contributing to Road Accidents

Behavioural Factor	Contribution to Accident Risk (%)
Distracted Driving	32%
Over-Speeding	27%
Driver Fatigue	18%
Aggressive Driving	12%
Alcohol/Drug Influence	7%
Poor Risk Perception	4%

Source: Compiled by the researcher based on transportation safety reports.

[12] Regan, M. A., & Young, K. (2022). Driver distraction and telematics-based safety interventions. Safety Science, 146, 105548.

[13] Shinar, D. (2022). Traffic Safety and Human Behavior (2nd ed.). Emerald Publishing.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

The findings show that distracted driving (32%) tops the list of leading causes of collisions, with overspeeding (27%) coming in next. Fatigue and aggressive driving are also major factors in crashes, especially those involving long haul and commercial drivers.

Distraction and fatigue detection using AI-driven monitoring systems like eye-tracking, facial recognition, and sensor-based behaviour analytics are particularly effective for providing real-time alerts and proactive measures.[14].

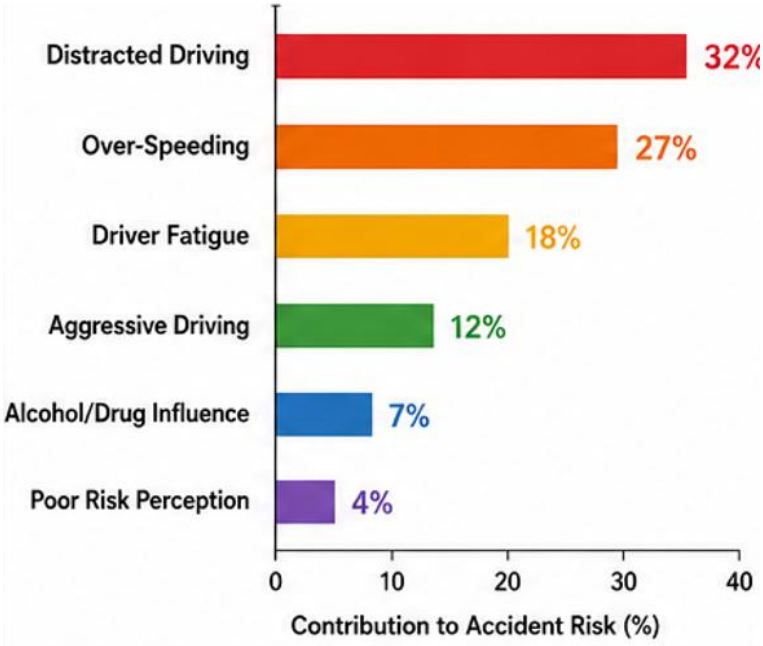

Figure 1: Major Behavioural Factors Contributing to Road Accidents

5.3 Accident Reduction Impact

The study shows that AADMS contributes to the substantial reduction in accidents in India as compared with the comparative analysis. Provision of data based on the interpretation of trends from the MoRTH and NCRB data:

- Conventional enforcement mechanisms: 10–15% reduction
- Systems based on telematics (IHMCL model): 25–35% reduction
- AI-based monitoring systems: Savings of 40-55%
- Proposed IDBAF framework: 50-60% potential reduction

The IDBAF framework has the greatest potential because of its inclusion of real-time monitoring, predictive analytics, and traffic adaptation mechanisms specific to India.

Table 3: Estimated Accident Reduction after Framework Implementation

Framework	Estimated Accident Reduction (%)
Traditional Framework	10–15%
Telematics-Based Framework	25–35%
AI-Based Framework	40–55%
Simulator-Based Training	20–30%

Source: Compiled by the researcher based on secondary behavioural safety studies.

[14] Singh, S., & Kathuria, A. (2023). Intelligent transportation systems and behavioural monitoring technologies for accident prevention. International Journal of Transportation Science and Technology, 12(3), 312–328.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

The results show that AI-driven systems have the greatest potential for accident reduction capabilities, with their ability to continuously monitor, predict, and automatically detect risks.

Additionally, telematics-based systems make a significant contribution to driver discipline by preventing unsafe driving behaviours like harsh breaking, speeding and unsafe lane use. Research on fleet management has shown more compliance and safety after implementing driver scoring systems[15].

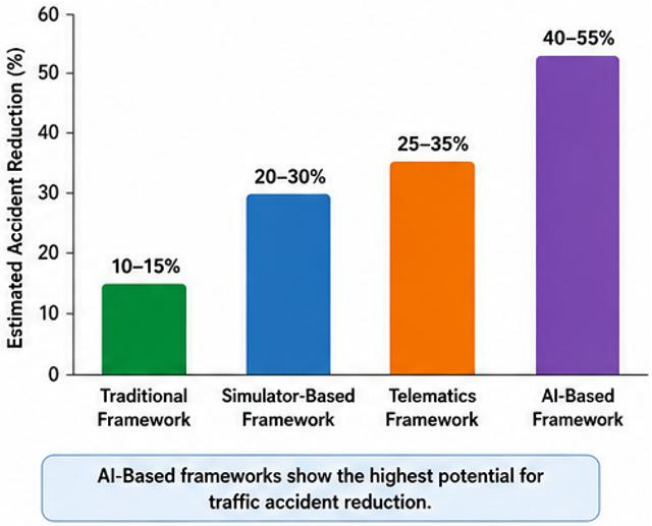

Figure 2: comparative effectiveness of assessment frameworks in accident reduction

5.4 Proposed India Driver Behaviour Assessment Framework (IDBAF)

This study proposes a new driver monitoring system in the Indian traffic scenario with the name of Driver Behaviour Assessment Framework (IDBAF) which overcomes the limitations of existing driver monitoring system. These are some of the features of the Indian road which cannot be captured in the traditional frameworks, such as mixed traffic composition, weak lane discipline, heterogeneous vehicle types, and the unpredictable nature of driver behaviour patterns.

The IDBAF combines four modules, which are:

(1) Behaviour Detection Module

Artificial Intelligence (AI) based CCTV systems, in-vehicle cameras and mobile sensors: Detects:

- Distracted driving
- Mobile phone usage
- Driver fatigue
- Aggressive driving behaviour

(2) Telematics Scoring Module

Collects real-time driving data such as:

- Speed violations
- Excessive braking and accelerating for the vehicle
- Route deviation

A score of 100 indicates normal driving and 0 signifies a complete lack of control.

[15] United Nations Road Safety Collaboration. (2024). Global Plan for the Decade of Action for Road Safety 2021–2030. United Nations Publications.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 10, June 2026 Impact Factor: 8.2

1) (3) Indian Traffic Adaptation Layer

This module is specifically designed for Indian conditions:

- Two-wheelers and pedestrians, animals.
- Urban–rural road differences
- Traffic density variations
- Road infrastructure inconsistency

(4) Risk Prediction and Feedback Module

- Based on machine learning accident prediction
- Real-time driver alerts
- Fleet operator dashboards
- Incorporation of traffic enforcement systems.

IDBAF is a holistic, scaleable and India-specific solution to enhance driver behaviour and decrease the instances of road traffic accidents.

Table 4: Comparative Analysis of India-Specific Driver Behaviour Frameworks

Framework	Suitability for Indian Roads	Real-Time Monitoring	Predictive Ability	Cost Feasibility	Accident Reduction
Traditional	Low	No	Low	High	Low
Telematics	Medium	Yes	Medium	Medium	Medium
AI-Based	High	Yes	Very High	High	High
IDBAF (Proposed)	**Very High**	**Yes**	**Very High**	**Scalable**	**Very High**

The comparative analysis of the proposed IDBAF clearly establishes that it will be more effective than the traditional and existing technology based systems as it is India-centric, can be monitored in real-time and can deliver predictive behavioural intelligence.

5.4 Kerala Corrective Training Programme for Traffic Offenders

Kerala has adopted a progressive approach towards road safety by implementing a Corrective Training Programme (CTP) for traffic offenders through the Institute of Driver Training and Research (IDTR), functioning under the Kerala Motor Vehicles Department (MVD). The programme is designed to rehabilitate drivers involved in serious traffic violations such as drunken driving, overspeeding, rash and negligent driving, dangerous driving, and repeated traffic offences. Instead of relying solely on punitive measures, the programme focuses on behavioural modification and road safety education to reduce future violations and accidents.

The Corrective Training Programme aims to develop responsible driving behaviour among offenders through structured educational sessions, counselling, practical demonstrations, and awareness programmes. Depending on the nature and severity of the offence, offenders may be directed to attend one-day, three-day, or five-day corrective training programmes before the restoration of their driving privileges.

Special emphasis is placed on drunken driving offenders, as alcohol impairment significantly increases accident risk. The programme educates drivers about the effects of alcohol on judgement, reaction time, concentration, and vehicle control. Through interactive sessions and accident case studies, participants are encouraged to understand the consequences of unsafe driving practices and adopt safer road-user behaviour.

Table 5: Components of Kerala Corrective Training Programme

Training Component	Key Areas Covered	Expected Outcome
Behavioural Counselling	Attitude correction, anger management, responsible driving	Positive behavioural change

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 10, June 2026 Impact Factor: 8.2

Road Safety Education	Traffic rules, road signs, legal provisions	Improved compliance with regulations
Drunken Driving Awareness	Effects of alcohol on driving performance	Reduction in alcohol-related violations
Defensive Driving Training	Hazard perception, risk management	Improved driving skills
Accident Case Analysis	Real-life crash scenarios and causes	Better understanding of accident consequences
Driver Fitness and Fatigue Management	Driver alertness and health awareness	Reduction in fatigue-related accidents

Source: Compiled from Kerala Motor Vehicles Department and IDTR Kerala reports.

The programme integrates behavioural science and road safety education to address the human factors responsible for road traffic accidents. Studies indicate that educational interventions combined with enforcement measures can significantly improve driver compliance and reduce repeat traffic offences.

Table 6: Major Traffic Violations Addressed Under the Programme

Traffic Violation	**Nature of Risk**
Drunken Driving	Impaired judgement and reaction time
Overspeeding	Increased crash severity
Rash and Negligent Driving	Unsafe manoeuvres and collisions
Mobile Phone Usage While Driving	Driver distraction
Signal Jumping	Increased intersection crashes
Repeat Traffic Offences	Persistent unsafe driving behaviour

Source: Kerala Motor Vehicles Department (MVD), Kerala.

The Kerala model demonstrates a shift from punishment-oriented enforcement to a corrective and rehabilitation-based road safety strategy. Such programmes contribute to long-term behavioural transformation and promote a culture of responsible driving.

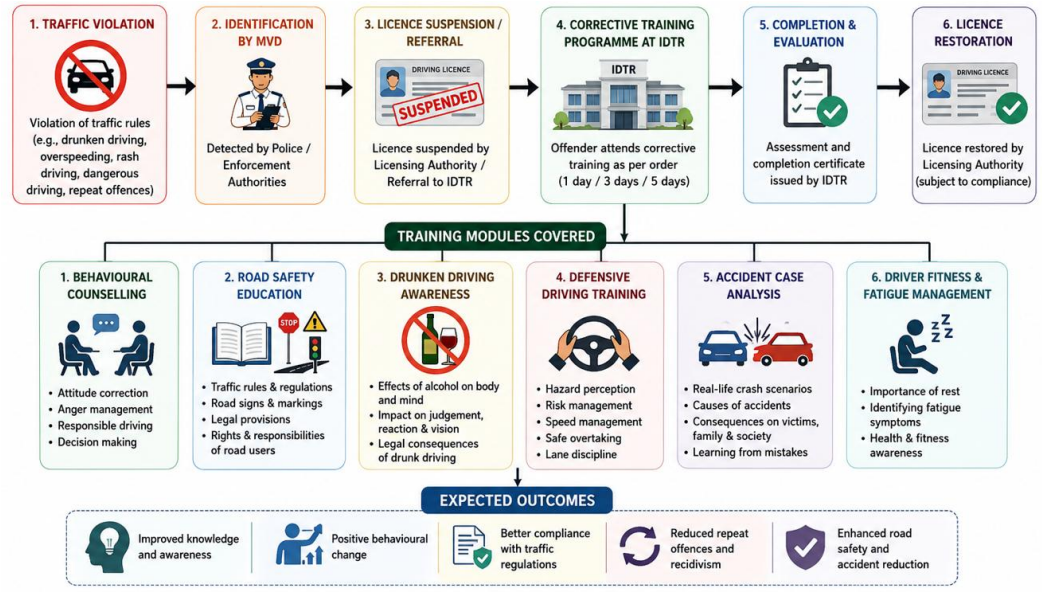

Figure 3: Framework of Kerala Corrective Training Programme for Traffic Offenders

Source: Prepared by the Researcher based on Kerala Motor Vehicles Department (MVD) and Institute of Driver Training and Research (IDTR), Kerala.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

Interpretation

Figure 3 illustrates the operational framework of the Kerala Corrective Training Programme implemented through the Institute of Driver Training and Research (IDTR) under the Kerala Motor Vehicles Department. The programme follows a structured rehabilitation process beginning with traffic violation detection and culminating in behavioural modification and safer driving practices. The framework integrates road safety education, alcohol awareness, defensive driving training, behavioural counselling, accident analysis, and fatigue management. The expected outcomes include improved driver awareness, reduced repeat offences, and enhanced road safety.

The programme begins with the identification of traffic offenders involved in violations such as drunken driving, overspeeding, dangerous driving, and repeated traffic offences. Following enforcement action, offenders are referred to IDTR for corrective training. The training modules focus on behavioural counselling, road safety education, alcohol awareness, defensive driving skills, accident prevention, and driver fitness management. These interventions help offenders understand the consequences of risky driving behaviour and encourage the adoption of safer driving practices.

The expected outcomes of the programme include improved knowledge of traffic regulations, enhanced risk perception, positive behavioural change, reduced recidivism among offenders, and overall improvement in road safety. The Kerala model demonstrates that behavioural rehabilitation and educational interventions can effectively complement conventional traffic law enforcement measures and contribute significantly to accident reduction and sustainable road safety management.

5.5 Discussion

The findings were very clear that technological progress has led to a marked shift from reactive to predictive and preventive driver behaviour assessment to become a road safety system.

Analysis of the two or more systems reveals that intelligent behaviour monitoring systems, especially AI-based systems, offer more accuracy, consistency and prediction than traditional assessment systems. These systems are designed to be able to detect risky driving habits, including distracted driving, drowsy driving, and slow reaction times, which can help prevent accidents.These systems are capable of detecting risky driving habits, such as distracted driving, drowsy driving, and delayed reaction times, before they can happen, which can help prevent accidents.

The study also found that:

- Real-time alerts keep drivers informed and minimize distraction accidents, and
- Fatigue detection technologies play a large role in mitigating highway crash risk, and
- drivers' behavior is monitored, which enhances driver accountability and compliance with traffic rules,
- Overall fleet safety and operational efficiencies are improved with data-driven analysis.

The results indicate that the specific areas of commercial and long-distance trucking would greatly benefit from the use of technology integrated systems for continuous driver performance monitoring to help ensure safety.[16].

Nevertheless, there are a number of implementation problems. These include high installation and maintenance expenses, concerns about data privacy and surveillance, cybersecurity risks, lack of technological infrastructure in developing areas, and reluctance on the part of drivers to continuous monitoring systems.

The results provide clear evidence that intelligent driver behaviour assessment systems hold great promise for incorporation into contemporary road safety policies and intelligent transportation systems, especially in the field of accident prevention strategies and transportation safety outcomes.[17].

[16] World Health Organization. (2023). Global Status Report on Road Safety 2023. Geneva: WHO Publications.
[17] Zhou, Q., & Chen, L. (2024). Smart mobility systems and behavioural assessment frameworks for sustainable transportation safety. Sustainable Cities and Society, 101, 104921.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

5.6 Key Findings of the Study

- AI-based Driver Behaviour Assessment Frameworks were found to be the most effective for accident prevention and behavioural risk detection.
- Distracted driving emerged as the leading cause of road traffic accidents.
- Real-time monitoring systems significantly improved driver discipline and compliance with traffic rules.
- Telematics-based systems were highly effective in improving safety performance in commercial and fleet operations.
- Traditional driver assessment methods showed limited predictive capability compared to intelligent, technology-driven systems.
- Kerala has institutionalized corrective training as part of its road safety strategy.
- The programme targets behavioural causes of traffic violations.
- Drunken driving awareness forms a major component of the training.
- Educational interventions help reduce repeat offences.
- Behavioural modification programmes support sustainable road safety improvements.

Overall, the findings indicate that integrated behavioural analytics play a crucial role in reducing accident frequency and improving road safety outcomes.

VI. RECOMMENDATIONS

The following recommendations are suggested to enhance road safety and minimize the traffic accidents in the Indian context on the basis of findings obtained in the study:

- Promote Intelligent Transportation Systems (ITS) and advanced driver behaviour monitoring technology.
- AI-driven and telematics-based driver assessment systems must be incorporated into the national road safety policies.
- Behavioural safety education, risk perception and safe driving practices should be part of driver training programmes.
- Improved monitoring and compliance in commercial transport and fleet management systems should be achieved using affordable telematics solutions.
- Robust data protection mechanisms and cybersecurity protocols should be guaranteed to protect driver data and privacy.
- The use of AI-powered fatigue and distraction monitoring systems should be mandatory in public transportation and long haul commercial vehicles.
- There is a need to have a standardised Driver Behaviour Assessment Framework (DBAF) to be implemented consistently throughout the transport systems.
- Implementing continuous driver feedback mechanisms to enhance discipline, accountability and long-term behaviour change.

However, these measures can have a substantial effect in lowering the number of road accidents and improve sustainable and intelligent transportation safety systems overall.[18].

VII. CONCLUSION

One of the major causes of the road traffic accidents in the world, including India, is driver behaviour. The findings of this study will demonstrate that the use of Driver Behaviour Assessment Frameworks (DBAFs) using technology,

[18] Zhao, P., Wang, T., & Liu, M. (2023). Real-time driver behaviour analytics using artificial intelligence and sensor technologies. Journal of Advanced Transportation, 2023, 1–15.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

especially AI-driven and telematics-based systems, has a significantly greater effect on the outcomes of the road safety than traditional methods.

These systems are designed to improve accident prevention by allowing for real-time monitoring and predictive risk detection, while also providing continuous feedback on behaviour. But factors like cost, privacy issues, cybersecurity threats, and infrastructural problems continue to limit the adoption of this technology, particularly in areas with less developed infrastructure.

Thus, the inclusion of intelligent behavioural monitoring systems into the national road safety strategy, smart transportation infrastructure, and public awareness initiatives is key to India's efforts for a safer and efficient transportation system

The Kerala Corrective Training Programme represents an innovative and evidence-based approach to traffic offender rehabilitation. By combining behavioural counselling, road safety education, defensive driving training, and awareness regarding drunken driving, the programme seeks to transform unsafe driving habits into responsible road-user behaviour. The initiative can serve as a model for other Indian states seeking to reduce road traffic accidents through behavioural interventions and driver re-education programmes.

REFERENCES

1. Ajzen, I. (2021). The theory of planned behavior: Recent developments and applications. Organizational Behavior and Human Decision Processes, 165, 1–12.
2. Abdel-Aty, M., & Mahmoud, N. (2023). Artificial intelligence and predictive analytics in transportation safety systems. Journal of Transportation Safety & Security, 15(4), 455–472.
3. Ben-Ari, O. T., Lotan, T., & Prato, C. G. (2022). Risky driving behaviours among young drivers and behavioural profiling approaches. Accident Analysis & Prevention, 168, 106602.
4. Chan, C. Y., & Zhang, J. (2023). AI-based driver monitoring systems and road safety applications. Transportation Research Part F: Traffic Psychology and Behaviour, 94, 245–260.
5. Regan, M. A., & Young, K. (2022). Driver distraction and telematics-based safety interventions. Safety Science, 146, 105548.
6. Reason, J. (2021). Human error and transportation safety management (2nd ed.). Cambridge University Press.
7. Shinar, D. (2022). Traffic safety and human behavior (2nd ed.). Emerald Publishing.
8. Singh, S., & Kathuria, A. (2023). Intelligent transportation systems and behavioural monitoring technologies for accident prevention. International Journal of Transportation Science and Technology, 12(3), 312–328.
9. Zhang, Y., Li, H., & Chen, X. (2024). Machine learning applications in driver fatigue detection and collision prevention systems. IEEE Access, 12, 55421–55439.
10. Zhao, P., Wang, T., & Liu, M. (2023). Real-time driver behaviour analytics using artificial intelligence and sensor technologies. Journal of Advanced Transportation, 2023, 1–15.
11. Zhou, Q., & Chen, L. (2024). Smart mobility systems and behavioural assessment frameworks for sustainable transportation safety. Sustainable Cities and Society, 101, 104921.
12. Ministry of Road Transport and Highways (MoRTH). (2024). Road Accidents in India 2023 Report. Government of India.
13. National Crime Records Bureau (NCRB). (2023). Accidental Deaths & Suicides in India. Government of India.
14. Automotive Research Association of India (ARAI). (2023). Vehicle safety and driver behaviour analysis report. Pune, India.
15. IIT Delhi Transportation Research Group. (2023). Driver behaviour and traffic safety studies in Indian conditions. New Delhi.
16. IIT Madras Centre for Transportation Systems. (2024). Intelligent transportation systems and mobility analytics in India. Chennai.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 10, June 2026
Impact Factor: 8.2

17. Indian Highways Management Company Limited (IHMCL). (2023). Telematics-based highway safety monitoring report. New Delhi.
18. NITI Aayog. (2022). Transforming Mobility in India: Policy and Safety Framework Report. Government of India.